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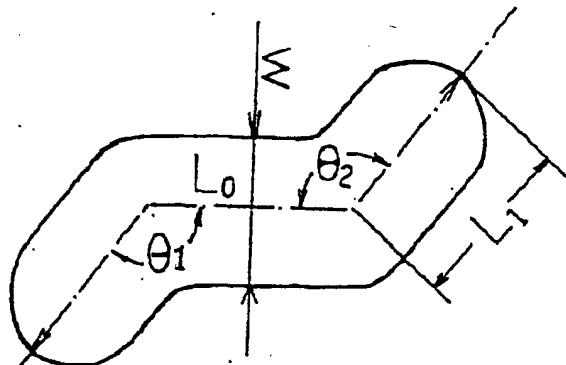
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【目的】 柔らかな風合いを維持しながら、きめ細かい光沢感および適度なシャリ感を有し、しかも、吸水性能に優れたポリアミド異形断面繊維と、この異形断面繊維を用いた良好な被覆状態を有する覆弹性糸およびきれいな編面を有するストッキングを提供する。

【構成】 特定の断面形状を有するポリアミド異形断面繊維と、この特殊異形断面繊維を用いた被覆状態の良い被覆弹性糸およびストッキング。



【請求項1】 単糸纖度が0.5～7デニールのポリアミド繊維からなり、その繊維の断面形状が相反する方向に2箇所屈曲した中心軸を有する偏平型であって、屈曲角(θ₁お

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[Objective] While the support doing the soft texture, it possesses the fine lusterous feel and moderate challis feel, furthermore, it offers the coated elastic yarn which possesses the satisfactory coating state which uses the polyamide modified cross-section fiber and this modified cross-section fiber which are superior in the water absorption and the stocking which possesses the clean flat surface.

[Constitution] The coated elastic yarn and the stocking where the coating state which uses the polyamide modified cross-section fiber and this special modified cross-section fiber which possess the specific cross section shape is good.

[Claim 1] single fiber fineness of polyamide fiber of 0.5 to 7 denier to consist. Being a flat type which possesses the center axis which

より $\theta_2$ ) が $90 \sim 160^\circ$  であり、かつ、偏平断面の屈曲した中心軸の長さ ( $L_0$ ) と偏平断面の厚み ( $W$ ) との比すなわち偏平率 ( $L_0/W$ ) が $3 \sim 6$  であり、さらには、中心軸の長さに対する両端の各屈曲部の長さの比 ( $L_1/L_0$ ) が $0.2 \sim 0.4$  であることを特徴とするポリアミド異形断面繊維。

**【請求項2】** 弹性糸からなる芯糸に被覆糸として請求項1記載のポリアミド異形断面繊維を配した被覆弾性糸。

**【請求項3】** 請求項1記載のポリアミド異形断面繊維及び／または請求項2記載の被覆弾性糸を用いたストッキング。

#### [0001]

**【産業上の利用分野】** 本発明は、ポリアミド異形断面繊維に関する。さらに詳しくは、特にストッキングなどに適した異形断面繊維と該異形断面繊維を用いた被覆弾性糸およびストッキングに関するものである。

#### [0002]

**【従来の技術】** ストッキング分野において、弾性糸からなる芯糸にポリアミド繊維を被覆した被覆弾性糸がストッキング用素材として主流となり、フィット性に優れたものとなっている。しかし、最近の消費者要求としては、柔軟性、吸汗性能、および適度なシャリ感等の着用時の快適性が要求されている。さらにストッキングは、脚を美しくかつ細く見せるなどのファッショング衣料として定着しつつあり、きめ細かい光沢感などのファッショング性が要求されている。

**[0003]** これら快適性およびファッショング性を満たすため、従来より繊維断面の異形化が検討されてきた。しかしながら、従来の多葉断面ではシャリ感はあるがガサツキ感が強く快適とは言えず、さらに、きついギラツキ感（光

the 2 site bending is done in the direction where the cross section shape of the fiber is contrary being. The bending angle ( $\theta_1$  and  $\theta_2$ ) is the  $90$  to  $160^\circ$ . at the same time, the bending of the flat cross section the length of the center axis which is done ( $L_0$ ) with the thickness of the flat cross section ( $W$ ) with the ratio namely oblateness ( $L_0/W$ ) is the  $3$  to  $6$ . furthermore, the polyamide modified cross-section fiber which designates that the ratio ( $L_1/L_0$ ) of the length of each bending part of the both ends for the length of the center axis is the  $0.2$  to  $0.4$  as feature.

**[Claim 2]** In the wadding which consists of the elastic yarn as the coating thread the Claim 1 the coated elastic yarn which allots the polyamide modified cross-section fiber which is stated.

**[Claim 3]** The Claim 1 the polyamide modified cross-section fiber which is stated and / or the Claim 2 the stocking which uses the coated elastic yarn which is stated.

#### [0001]

**[Field of Industrial Application]** The present invention regards the polyamide modified cross-section fiber. Furthermore details are something regarding the coated elastic yarn and the stocking which use the modified cross-section fiber and the said modified cross-section fiber which are suited for the especially stocking or the like.

#### [0002]

**[Prior Art]** In the stocking field, the coated elastic yarn which the polyamide fiber the coating is done it becomes the mainstream in the wadding which consists of the elastic yarn as the raw material for the stocking, it has become something which is superior in the fit. But, the comfort at the time of the wearing of the flexibility, the sweat absorbing performance, and the moderate chalis feel etc is required as the recent consumer demand. Furthermore the stocking the fixing is doing to be beautiful and is shown thinly the leg as the fashion clothing of the or the like which, the fashion sense of the fine lusterous feel or the like is required.

**[0003]** In order to fill up these comfort and the fashion sense, the modification of the fiber cross section the investigation was done from the conventional. But, with the conventional

沢感) があり好感度の低い物しか得られていない。また、曲げ応力が大きいためきれいな編面を有したストッキングが得られていない。一方、偏平断面では柔らかい風合いは得られるが腰が無くヌメリ感があり、さらには、光沢感が少なくファッショニ性が低い物しか得られていない。

multilobed cross section as for the challis feel it is, but the comfortable you cannot call the rough hand strongly, furthermore, there is a hard lusterous hand (lusterous feel) and only those where the friendship sensitivity is low it is obtained. In addition, because the bending stress is large, the stocking which possesses the flat surface which is clean is not obtained. On the other hand, With the flat cross section as for the soft texture it is obtained, but there is nota waist and there is a slimy feel, furthermore, the lusterous feel is obtained to belittle only those where the fashion sense is low.

## 【0004】

【発明が解決しようとする課題】本発明の目的は、従来公知のポリアミド異形断面繊維が有する課題を克服して、柔らかな風合いを維持しながら、きめ細かい光沢感および適度なシャリ感を有し、しかも、吸水性能に優れたポリアミド異形断面繊維と、この異形断面繊維を用いた良好な被覆状態を有する覆弹性糸およびきれいな編面を有するストッキングを提供することである。

## [0004]

[Problems to be Solved by the Invention] As for objective of the present invention, Overcoming the problem which the polyamide modified cross-section fiber of the prior public knowledge has. While the support doing the soft texture, it is to offer the coated elastic yarn which possesses the satisfactory coating state which uses the polyamide modified cross-section fiber and this modified cross-section fiber which possessthe fine lusterous feel and moderate challis feel, furthermore, are superior in the water absorption and the stocking which possesses the clean flat surface.

## 【0005】

【課題を解決するための手段】本発明者は、上記目的を達成するために鋭意研究を重ねた結果、ポリアミド繊維の断面形状を特定の形状にすることにより、きめ細かい光沢感、柔らかな風合い、適度なシャリ感および優れた吸水性が得られることを見出した。さらに、ストッキングの素材として該異形断面繊維を用いると、上述した優れた特徴を有するとともにきれいな編面が得られることを見出し本発明に達した。

## [0005]

[Means to Solve the Problems] As for the the inventor, by designating the cross section shape of the result and the polyamide fiber which repeat the diligent research in order to achieve the above-mentioned objective as the specific shape, the fine lusterous feel and soft texture, the fact that you can obtain the moderate challis feel and the water absorbancy which is superior wasdiscovered. Furthermore, when the said modified cross-section fiber is used as the raw material of the stocking, as itpossesses the feature which the description above it did and issuperior you discovered the fact that you can obtain the clean flat surface and reached to the the present invention.

【0006】即ち本発明は、単糸纖度が0.5~7デニールのポリアミド繊維からなり、その繊維の断面形状が相反する方向に2箇所屈曲した中心軸を有する偏平型であって、屈曲角(θ1およびθ2)が90~160°であり、かつ偏平断面の屈曲した中心軸の長さ(L0)と偏平断面の厚み(W)との比すなわち偏平率(L0/W)が3~6であり、さらには、中心軸の長さに対する両端の各屈曲部の長さの比(L1/L0)が0.2~0.4であることを特徴とするポリアミド異形断面繊維(図1参照)に関し、また、弹性糸か

[0006] Namely as for the present invention, single fiber fineness of polyamide fiber of 0.5 to 7 denier to consist. Being a flat type which possesses the center axis which the 2 site bending is done in the direction where the cross section shape of the fiber is contrary being. The bending angle (θ1 and θ2) being the 90 to 160°. to be. At the same time the bending of the flat cross section the length of the center

らなる芯糸に被覆糸として前記ポリアミド異形断面繊維を配した被覆弹性糸、前記ポリアミド異形断面繊維および／または前記被覆弹性糸を用いたストッキングに関するものである。

【0007】本発明のポリアミド異形断面繊維は、偏平型断面であることにより、繊維断面が丸断面に比べて、断面の短軸方向への屈曲性が向上し柔らかな風合いと良好な被覆状態、および、きれいな編面が得られる。ここでいう良好な被覆状態とは、弹性糸からなる芯糸にカバリングして被覆とした時に、比較的密な被覆状態と粗い被覆状態が混在せず、弹性糸からの被覆糸の飛び出し（ループ）が無く均一に被覆されている状態をいう。また、きれいな編面とは、編成されている被覆弹性糸が良好な被覆状態を保ちながら、編成された編目が均一な状態を言う。

【0008】本発明のポリアミド異形断面繊維は、図1に示すような断面形状を有し、偏平率が3～6である。従来にない柔らかな風合いを得るためにには、偏平率が3以上あることが必要である。逆に、偏平率が6を越えると製造技術の難度が高くなり、製糸性が悪化するとともに柔らかくなりすぎてヘタリ感およびヌメリ感が強くなる。柔らかくかつ、適度なシャリ感のある風合いを得るには、好ましくは4～5の範囲である。

【0009】本発明のポリアミド異形断面繊維の断面形状は、相反する方向に2箇所屈曲した中心軸を有する。偏平

axis which is done (L<sub>0</sub>) with the thickness of the flat cross section (W) with the ratio namely oblateness (L<sub>0</sub>/W) being the 3 to 6. to be. Furthermore, In regard to the polyamide modified cross-section fiber (Drawing 1 reference) which designates that the ratio (L<sub>1</sub>/L<sub>0</sub>) of the length of each bending part of the both ends for the length of the center axis is the 0.2 to 0.4 as feature. in addition, the coated elastic yarn and the aforementioned polyamide modified cross-section fiber which allot the aforementioned polyamide modified cross-section fiber to the wadding which consists of the elastic yarn as the coating thread and / or it is something regarding the stocking which uses the aforementioned coated elastic yarn .

[0007] As for the polyamide modified cross-section fiber of the present invention, the fiber cross section comparing to the round cross section, by being a flat type cross section, the bendability to the short axis direction of the cross section improves and can obtain the soft texture and the satisfactory coating state, and the clean flat surface. The satisfactory coating state referred to here, the covering doing in the wadding which consists of the elastic yarn, when making the coating, the relatively dense coating state the rough coating state does not exist together, is not a springing out (loop) of the coating thread from the elastic yarn and is the state which the coating is done to the uniform. In addition, the clean flat surface, while the coated elastic yarn which the knitting is done maintaining the satisfactory coating state, the knit stitch which the knitting is done it is the uniform state.

[0008] The polyamide modified cross-section fiber of the present invention, has the kind of cross section shape which is shown in the Drawing 1, the oblateness is the 3 to 6. In order to obtain the soft texture which is not in the conventional, it is necessary for the oblateness to be a 3 or greater. When conversely, the oblateness exceeds the 6, as the difficulty of the production technology becomes high, the yarn producing behavior does the deterioration, becoming too soft, the limp feel and the slimy feel become strong. To obtain the texture which is soft, at the same time, has the moderate chalky feel, it is a range of the preferably, 4 to 5.

[0009] The cross section shape of the polyamide modified cross-section fiber of the present

型断面繊維の中心軸を相反する方向に屈曲させることにより、同一方向に屈曲させたものに比べ、単糸間の断面が同一方向に並びやすいので密着性が良くなり、吸水性が向上する（図2参照）。さらに、屈曲部を2箇所所有することにより、繊維断面が丸断面のものおよび屈曲箇所が1箇所のものにくらべて、毛細管現象が生じやすく吸水性が向上する。また、繊維中心軸を3箇所以上屈曲させると、製糸性が悪く、製造技術が難しくなる。

**[0010]** 本発明のポリアミド異形断面繊維は、中心軸の屈曲角（θ1およびθ2）が90～160°である。屈曲角（θ1およびθ2）が90°未満では、屈曲性が低下し良好な被覆状態が得られず、しかも、きれいな編面を有するストッキングが得られない。屈曲角が160°を越えると良好な吸水性能が得られない。しかも、ヌメリ感が生じシヤリ感が得られない。好ましくは、100～140°である。

**[0011]** 本発明のポリアミド異形断面繊維は、中心軸の長さに対する屈曲部の長さの比が0.2～0.4である。長さが0.2未満または0.4を越えると、皮膚と繊維の接觸面積が増加するためシヤリ感が低下し、ヌメリ感が発生する。好ましくは、0.25～0.35である。さらに、本発明のポリアミド異形断面繊維は、単糸纖度が0.5～7である。0.5デニール未満では製糸性が悪く、製造技術が難しくなる。一方、7デニールを越えると風合いが堅くなる。好ましくは、ポリアミド異形断面繊維を被覆糸としてストッキングに用いる場合は、単糸纖度は0.9～3デニールの範囲が、また、加工しないでそのまま生糸としてストッキングに用いる場合は、好ましくは、3～6デニールである。

invention has the center axis which the 2 site bending is done in the direction which is contrary. The center axis of the flat cross section fiber by the bending being able to point in the direction which is contrary, the bending because the cross section between the single fiber is easy to line up to the same direction, in comparison with those which it could point in the same direction, the contact becomes good, the water absorbancy improves (Drawing 2 reference). The fiber cross section those and the bending site of the round cross section the capillary phenomenon to occur the water absorbancy improves easily in comparison with those of the 1 site, furthermore, by the 2 site possessing the bending part. In addition, when the bending above the 3 site it can point to the fiber center axis, the yarn producing behavior becomes bad, the production technology difficult.

**[0010]** As for the polyamide modified cross-section fiber of the present invention, the bending angle ( $\theta_1$  and  $\theta_2$ ) of the center axis is the 90 to 160°. The bending angle ( $\theta_1$  and  $\theta_2$ ) does and under the 90°, the bendability the decrease cannot obtain the satisfactory coating state, furthermore, cannot obtain the stocking which possesses the clean flat surface. When the bending angle exceeds the 160°, you cannot obtain the satisfactory water absorption. Furthermore, the slimy feel occurs and cannot obtain the chalky feel. It is a preferably, and a 100 to 140°.

**[0011]** As for the polyamide modified cross-section fiber of the present invention, ratio of the length of the bending part for the length of the center axis is the 0.2 to 0.4. When the length exceeds under or the 0.4 the 0.2, because the contact area of the skin and the fiber increases, the chalky feel does the decrease, the slimy feel does the generation. It is a preferably, and a 0.25 to 0.35. Furthermore, as for the polyamide modified cross-section fiber of the present invention, the single fiber fineness is the 0.5 to 7. Under the 0.5 denier the yarn producing behavior becomes bad, the production technology difficult. On the other hand, When it exceeds the 7 denier, the texture becomes hard. When it uses for the stocking with the preferably, and the polyamide modified cross-section fiber as the coating thread, the single fiber fineness the range of the 0.9 to 3 denier, in addition, the fabrication without doing, when it uses for the stocking as the raw silk that way, it is a preferably, and a 3 to 6 denier.

【0012】本発明でいう被覆弹性糸とは、芯糸に弹性糸として一般にポリウレタン系合成繊維、ポリエステル系弹性糸などを用い、弹性糸を伸張した状態で、これに被覆糸としてポリアミド異形断面繊維を1重に巻き付けたもの（シングルカバリングヤーン）、被覆糸を2重に巻き付けたもの（ダブルカバリングヤーン）、または、被覆糸を空気によって交絡させたものなどという。被覆弹性糸は、通常、3倍程度伸張して被覆加工されるが、弹性糸の物性により特に限定されない。

【0013】本発明のポリアミド異形断面繊維は、偏平型断面のため、透過率が高く乱反射光自体が少なく、しかも三葉および4葉に比べ反射面が多いのため反射光が広い角度に拡散される。そのため、本発明のポリアミド異形断面繊維は強い反射光がなく均一に反射し、編地にした場合、きめ細かい光沢感が得られる。また、本発明でいうポリアミド異形断面繊維とは、ナイロン6、ナイロン66などのポリマーあるいは、これらポリアミド系ポリマーを共重合、ブレンドさせたポリマーから得られる繊維である。さらに、このポリアミド異形断面繊維は、制電剤、安定剤、滑剤などの添加剤を含んでいてもよいが、その添加量は本発明における特性および製糸性等を損なわない範囲とすることが必要である。

【0014】なお、本発明でいうストッキングには、パンティーストッキング、薄手のソックス等も含まれ、本発明の被覆弹性糸及び／またはポリアミド繊維が用いられていれば良い。具体的には、本発明の被覆弹性糸や本発明のポリアミド異形断面繊維のみで編成されたものはもちろん、例えば、本発明のポリアミド異形断面繊維と従来の被覆弹性糸とを交織させたもの、本発明の被覆弹性糸と従来のポリアミド繊維を交織させたもの、本発明のポリアミド異形断面繊維と従来のポリアミド繊維で編成されたものなども

[0012] As it is called in the present invention the coated elastic yarn . In the wadding as the elastic yarn generally making use of the polyurethane type synthetic fiber and the polyester elastic yarn or the like , with the state which the elastic yarn the drawing is done. in this those which wind the polyamide modified cross-section fiber around 1 heavy as the coating thread ( single covering yarn ), those which wind the coating thread around 2 heavy ( double covering yarn ), or, it is the thing or the like which with the air the entanglement it could point the coating thread . The coated elastic yarn is done. usually, the 3 times extent drawing doing, the coating fabrication , but especially it is not limited by the property of the elastic yarn .

[0013] As for the polyamide modified cross-section fiber of the present invention , because of the flat type cross section , the transmittance to behigh the diffuse reflectance light itself is little. the reflective surface is many furthermore in comparison with the trilobal and the tetralobal for the sake of. the diffusion it is done in the angle where the reflected light is wide. Because of that, there is not a strong reflected light and the reflected ray does the polyamide modified cross-section fiber of the present invention in the uniform. when it makes the knit , it can obtain the fine lusterous feel . In addition, the polyamide modified cross-section fiber as it is called in the present invention . the polymer of the nylon 6 and the nylon 66 or the like or, it is a fiber which is obtained from the polymer which the copolymerization and the blend it could point these polyamide polymer . Furthermore, this polyamide modified cross-section fiber , may include the additive of the static electricity control agent , the stabilizer and the lubricant or the like , but as for the addition quantity it is necessary to make the range which does not impair the characteristic or the yarn producing behavior etc in the present invention .

[0014] Furthermore, if also the panty stocking and the socks etc of the light are included by the stocking as it is called in the present invention , and the coated elastic yarn of the present invention and / or the polyamide fiber is used, it is good. Concretely, as for those which the knitting are done of course with only the coated elastic yarn of the present invention and the polyamide modified cross-

含まれる。

section fiber of the the present invention . also the thing or the like which the knitting is done is included with the polyamide modified cross-section fiber and the conventional polyamide fiber of the thing and the the present invention which the combined knit it could point the coated elastic yarn and the conventional polyamide fiber of the thing and the the present invention which the combined knit . it could point the polyamide modified cross-section fiber and the conventional coated elastic yarn of the for example and the the present invention .

### [0015]

【実施例】以下、実施例を挙げて本発明をさらに具体的に説明する。なお、実施例におけるポリアミド異形断面繊維、被覆弾性糸およびストッキングの各性能は、下記の方法によって測定した。

### [0015]

[Working Example(s)] Listing the below and the Working Example . furthermore you explain the the present invention concretely . Furthermore, the measurement it did each performance of the polyamide modified cross-section fiber , the coated elastic yarn andthe stocking in the Working Example . with the below-mentioned method .

#### (1) 繊維の偏平率

異形断面写真から、偏平断面の屈曲した中心軸の長さ (L<sub>0</sub>) と偏平断面の厚み (W)との比すなわち偏平率 (L<sub>0</sub>/W) を算出した。

#### (1) oblateness of fiber

From the asymmetric cross section photograph . the bending of the flat cross section the length of the center axis which isdone (L<sub>0</sub>) with the thickness of the flat cross section (W) with the ratio namely oblateness (L<sub>0</sub>/W) the calculation was done.

#### (2) 繊維の曲げ応力

全纖度を 996 デニールに合糸し、連続ベンディング測定器によって、測定した。曲げ応力値 (g) が小さいほど柔らかい。

#### (2) bending stress of fiber

The combination thread it did the total fineness in the 996 denier , the measurement it didwith the continuous bending measuring apparatus . The extent where the bending stress (g) is small it is soft.

#### (3) 被覆弾性糸の被覆状態

20デニールのポリウレタン弾性糸を3倍に伸張しつつ、ポリアミド異形断面繊維を1重に巻き付け被覆弾性糸を得た。得られた被覆弾性糸に荷重0.1 gを加え、光学顕微鏡にて糸長20cm内の粗の被覆部(ループ)数を観測した。

#### (3) coating state of coated elastic yarn

While the drawing doing the polyurethane elastic yarn of the 20 denier in the 3 times , it woundthe polyamide modified cross-section fiber around 1 heavy and obtained the coated elastic yarn . In the coated elastic yarn which is obtained the roughly coated part ( loop ) number inside the fiber length 20cm was observed with the optical microscope including the load 0.1g.

#### (4) ストッキングの吸水性

ストッキングの吸水性は、JIS L 1018-77、6.27、1B (バイレック法) によって測定した。

#### (4) water absorbancy of stocking

The measurement it did the water absorbancy of the stocking . with the JISL1018-77, the 6.27 andthe 1B ( Bireck method ).

## (5) ストッキングの光沢

パネラーにストッキングを着用させ、官能検査にて、光沢がありすぎる [5] ~適度な光沢 [3] ~光沢無し [1] の5段階評価した。

[0016] また、分光光度計によりストッキングの拡散反射率を測定した。反射率が大きいほど光沢がある。

## (6) ストッキングの風合い

パネラーにストッキングを着用させ、官能検査にて、シャリ感がありすぎる [5] ~適度なシャリ感 [3] ~ヌメリ感がある [1] 、および、柔らかい [5] ~堅い [1] の5段階評価した。

## (7) ストッキングの編面

基準のストッキングと比較して、図3の編面をきれい [5] 、図4の編面を悪い [1] とし、官能検査で5段階評価した。

## [0017]

【実施例1~6】ナイロン6 6ポリマー(98%硫酸相対粘度:  $[\eta] = 2.7$ )を溶融紡糸し、引き継ぎ伸度が約40%になるよう延伸比を調整し、巻取り速度4000m/分で巻取りながら、表1に示した断面を有する10デニール/5フィラメントおよび10デニール/10フィラメント(実施例4)のポリアミド異形断面繊維を製糸した。

[0018] 20デニールのポリウレタン弾性糸を3倍に伸張しつつ、製糸した繊維を1重に巻き付け被覆弾性糸(シングルカバリングヤーン: 摩擦数=1800T/M)を得た。得られた被覆弾性糸のみを用い、針数360本、口径3.4インチのパンスト編機で編成し、染色、柔軟処理、ファイナルセットを経てストッキング製品(フルサポートタイプ)を得た。

## [0019]

## (5) brilliance of stocking

The wearing point to the stocking to the panel member . the 5 step evaluation of the [5] to moderate brilliance [3] to brilliance none [1] which has the brilliance with the visual inspection too much it did.

[0016] In addition, the diffuse reflectivity of the stocking the measurement was done with the spectrophotometer . There is an extent brilliance where the reflectivity is large.

## (6) texture of stocking

The wearing point to the stocking to the panel member . [1], and, the soft [5] to where there is a [5] to moderate challis feel [3] to slimy feel which has the and the challis feel with the visual inspection too much the 5 step evaluation of the hard [1] it did.

## (7) flat surface of stocking

By comparison with the stocking of the reference , the flat surface of the Drawing 3 clean [5], it is bad. [1] with it did the flat surface of the Drawing 4 . the 5 step evaluation did with the visual inspection .

## [0017]

[Working Examples 1 ~ 6] The nylon 66 polymer (98% sulfuric acid relative viscosity :  $[\eta] = 2.7$ ) the melt spinning was done, in order continuously for the elongation to become the about 40%, drawing ratio was adjusted and with the coil rate 4000 m/minute the coil, the polyamide modified cross-section fiber of the 10 denier /5 filament and the 10 denier /10 filament ( Working Example 4)which possess the cross section which is shown in the Table 1 the thread production wasdone.

[0018] While the drawing doing the polyurethane elastic yarn of the 20 denier in the 3 times . it woundthe fiber which the thread production is done around 1 heavy and obtained the coated elastic yarn ( single covering yarn : twist number = 1800T/M). The knitting it did with the panty hose knitting machine of the number of needles 360 and the opening diameter 3.4 inch making useof only the coated elastic yarn which is obtained. built the dyeing , the softening treatment andthe final set and obtained the stocking product ( full support type ).

## [0019]

【比較例1～8】実施例1～6に示した方法により、表1に示した10デニール／5フィラメントの偏平面纖維、三葉断面纖維、丸形断面纖維および屈曲したポリアミド異形断面纖維とした他は実施例1～6と同様にして製糸した。次いで実施例1と同様に、被覆弾性糸（シングルカバーリングヤーン）およびストッキング製品を得た。

【0020】以上、実施例1～6および比較例1～8にて得られた纖維、被覆弾性糸およびストッキング製品の評価結果を表1に示した。

【0021】

【表1】

	銘柄	断面	屈曲角 θ 12	偏平率 L0/W	屈曲長 L0/L1	繊維 曲応力 g	被覆 状態	ストッキング				
								編面	光沢率	光沢感	吸水性	風合い シャリ感
実施例 1	10/5	Z型	130	4.5	0.32	130	3	4	39	3	12	3
実施例 2	10/5	Z型	130	3.3	0.32	150	7	3～4	39	3～4	10	3～4
実施例 3	10/5	Z型	130	5.5	0.32	100	1	5	38	2～3	13	2～3
実施例 4	10/10	Z型	130	4.5	0.32	80	1	5	43	3～4	20	2～3
実施例 5	10/5	Z型	110	4.5	0.32	150	6	4	41	3	10	3～4
実施例 6	10/5	Z型	130	4.5	0.25	120	2	4	39	3	10	3
比較例 1	10/5	偏平	—	4.5	—	110	1	4	33	2	3	1
比較例 2	10/5	三葉	—	—	—	250	150	1	50	5	0	5
比較例 3	10/5	丸	—	—	—	200	120	2	30	1	4	1～2
比較例 4	10/5	Z型	80	4.5	0.32	170	50	2～3	43	4	17	5
比較例 5	10/5	Z型	170	4.5	0.32	120	1	4	37	2	4	1～2
比較例 6	10/5	Z型	130	4.5	0.18	110	1	4	36	2	3	1～2
比較例 7	10/5	Z型	130	4.5	0.41	150	10	4	37	2	5	2
比較例 8	10/5	同一方向	130	4.5	0.32	130	2	4～5	38	3	3	2～3

【0022】表1に示す結果から明らかなように、10デニール／5フィラメントでは偏平率3.3、4.5、5.5、屈曲長0.32、0.25および屈曲角110°、130°の場合（実施例1～6）、偏平面纖維（比較例1）および丸断面纖維（比較例3）に比べ、反射率が高く適度な光沢感となる。さらにストッキングのシャリ感および吸水性も高いという結果が得られた。また、三葉断面纖維（比較例2）に比べ、曲げ応力が小さく柔らかい。その結果、被覆弾性糸の被覆状態が良好であるという結果が得られ、また、適度な光沢感およびシャリ感を有しているという結果が得られた。

< Comparative Example 1 to 8 > The flat cross section fiber of the 10 denier /5 filament which is shown in the Table 1 with the method which is shown in the Working Example 1 to 6, the trilobal cross section fiber, the circular cross-section fiber and besides it makes the polyamide modified cross-section fiber which the bending is done to the thread production it did with as similar to the Working Example 1 to 6. Next in the same way as the Working Example 1, the coated elastic yarn (single covering yarn) and the stocking product was obtained.

[0020] Above, the Evaluation result of the fiber, the coated elastic yarn and the stocking product which with the Working Example 1 to 6 and the Comparative Example 1 to 8 are obtained was shown in the Table 1.

[0021]

[Table 1]

[0022] Way it is clear from the result which is shown in the Table 1, with the 10 denier /5 filament in case of the oblateness 3.3, the 4.5, the 5.5, the bending length 0.32, the 0.25 and the bending angle 110 degree and the 130 degree (Working Example 1 to 6), the reflectivity to be high becomes the lusterous feel which is moderate the flat cross section fiber (Comparative Example 1) and in comparison with the round cross section fiber (Comparative Example 3).

Furthermore you could obtain the result that also the chalky feel and the water absorbancy of the stocking are high. In addition, the bending stress is soft small in comparison with the trilobal cross section fiber (Comparative Example

[0023] なお、屈曲角が本発明の範囲外（比較例4、5）にある場合は、本発明のポリアミド異形断面繊維（実施例1～6）に比べ、比較例4は、屈曲角が80°（本発明の範囲より小さい）であるため、皮膚との接触面積が小さくシャリ感が強くガサツキ感が生じ、また、光沢感が強くなりすぎてファッション性が低下し、さらには、繊維の屈曲性が低下するために良好な被覆性およびきれいな編面が得られない。比較例5は、屈曲角が170°（本発明の範囲より大きい）であるため偏平断面糸に近づく、そのため、皮膚との接触面積が大きくなりヌメリ感が生じ、また、毛管現象が低下し吸水性能が低下する。さらには、反射光が少なくなり、きめ細かい光沢感が得られない。

2). You could obtain the result that the result, the coating state of the coated elastic yarn is the satisfactory. in addition, you could obtain the result which has possessed the moderate lusterous feel and the challis feel and says.

[0023] Furthermore, When the bending angle a (Comparative Example 4 and 5) outside the range of the present invention is. In the polyamide modified cross-section fiber (Working Example 1 to 6) of the present invention to compare. As for the Comparative Example 4, because the bending angle is the 80° (Than range of the present invention smaller), the contact area of the skin the challis feel occurs the rough hand small strongly. in addition, the lusterous feel becoming too strong, the fashion sense does, the decrease furthermore, the satisfactory coating property or the clean flat surface cannot obtain the bendability of the fiber in order the decrease to do. The Comparative Example 5, because the bending angle is the 170° (Than range of the present invention larger), gets near to the flat cross-section fiber, because of that, the contact area of the skin becomes large and the slimy feel occurs, in addition, the capillary phenomenon does the decrease and the water absorption does the decrease. Furthermore, the reflected light decreases, cannot obtain the fine lusterous feel .

[0024] In addition, when the bending length a (Comparative Example 6 and 7) outside the range of the present invention is. the Comparative Example 6, because the bending length is the 0.18 (Than range of the present invention smaller), gets near to the flat cross-section fiber in comparison with the polyamide modified cross-section fiber (Working Example 1 to 6) of the present invention, because of that, the contact area of the skin becomes large and the slimy feel occurs. In addition, the capillary phenomenon does the decrease and the water absorption does the decrease. Furthermore, the reflected light decreases, cannot obtain the fine lusterous feel . As for the Comparative Example 7, Comparative Example 6 similarity and the slimy feel occur, you cannot obtain the lusterous feel where the water absorption is low, is fine.

[0025] Furthermore, when the bending it has done in the same direction, as for the (Comparative Example 8), because the contact between the single fiber is less in comparison with the polyamide modified cross-section fiber (Working

[0025] さらに、同一方向に屈曲している場合（比較例8）は、本発明のポリアミド異形断面繊維（実施例1～6）に比べ、単糸間の密着性が少ないため毛細管現象が発生しにくく吸水性が低い。

Example 1 to 6) of the the present invention , the capillary phenomenon the generation to be difficult to do the water absorbancy is low.

## [0026]

【実施例7、8】表2に示した断面を有する15デニール／3フィラメントのポリアミド異形断面繊維とした他は実施例1～6と同様にして製糸した。ポリアミド繊維(12デニール／7フィラメント)を1重に巻き付けた被覆弾性糸(シングルカバリングヤーン)とポリアミド異形断面繊維を用いて、針数360本、口径3.4インチのパンスト編機で編成し、染色、柔軟処理、ファイナルセットを経て、ストッキング製品(交織タイプ)を得た。

## [0026]

< Working Example 7 and 8 >Besides it makes the polyamide modified cross-section fiber of the 15 denier /3 filament which possesses the cross section which is shown in the Table 2 the thread production it did with as similar to the Working Example 1 to 6. The knitting it did with the panty hose knitting machine of the number of needles 360 and the opening diameter 3.4 inch the coated elastic yarn which winds the polyamide fiber (12 denier /7 filament ) around 1 heavy ( single covering yarn ) with making use of the polyamide modified cross-section fiber . built the dyeing , the softening treatment and the final set , obtained the stocking product ( combined knit type ).

## [0027]

【比較例9】表2に示した15デニール／3フィラメント丸型断面繊維とした他は実施例5、6と同様にして製糸した。ついで実施例7、8と同様にストッキング製品(交織タイプ)を得た。以上、実施例7、8および比較例9にて得られた繊維およびストッキング製品の評価結果を表2に示した。

## [0027]

[Comparative Example 9] Besides it makes the 15 denier /3 filament round cross section fiber which is shown in the Table 2 the thread production it did with as similar to the Working Example 5 and the 6. The stocking product ( combined knit type ) was obtained next in the same way as the Working Example 7 and the8. Above, the Evaluation result of the fiber and the stocking product which with the Working Example 7, the8 and the Comparative Example 9 are obtained was shown in the Table 2 .

## [0028]

[表2]

## [0028]

[Table 2]

	銘柄	断面	屈曲角 θ 1 G 2	偏平率 L0/W	屈曲長 L0/L1	繊維 曲応力 g	ストッキング			
							光沢率	光沢感	風合い シャリ感	風合い 柔軟性
実施例7	15/3	Z型	130	4.5	0.32	250	27	3	4	4～5
実施例8	15/3	Z型	110	4.5	0.32	280	26	3	4～5	4～5
比較例9	15/3	丸	—	—	—	310	20	1	2	3

【0029】表2に示す結果から明らかなように、交織タイプのストッキングに屈曲した偏平形断面繊維を用いることにより(実施例7、8)、丸形断面繊維(比較例9)に比べ、光沢感およびシャリ感が向上し、柔らかい風合いとなるという結果が得られた。

[0029] In order to be clear from the result which is shown in the Table 2 . byusing the flat shape cross section fiber which the bending is done in the stocking ofthe combined knit type ( Working Example 7 and 8), become the soft texture you could obtain the result thatthe lusterous feel and the challis feel improve in comparison with the circular cross-section fiber ( Comparative

## 【0030】

【発明の効果】本発明のポリアミド異形断面繊維は、屈曲した中心軸を有する偏平型断面であるため、きめ細かい光沢感、柔らかな風合い、適度なシャリ感および優れた吸水性を示すものである。本発明のポリアミド異形断面繊維を用いた被覆弹性糸は、従来のものに比べて、良好な被覆状態を示す。

【0031】本発明の被覆弹性糸を用いたストッキングは、きれいな編面状態を示し、さらに、従来のものに比べ、着用する女性に快適感を与える、ファッショナブルな満足感をもたらすことができる。

## 【0032】

## 【0033】

【図1】本発明のポリアミド異形断面繊維の断面形状を模式的に示す説明図。

## 【0034】

【図2】本発明のポリアミド異形断面繊維の断面形状を示す模写図。

## 【0035】

【図3】20デニールのポリウレタン弹性糸を3倍に伸張しつつ、本発明のポリアミド異形断面繊維を1重に巻き付けた被覆弹性糸（シングルカバリングヤーン）を用いたストッキングの着用時の編面状態を示す拡大模写図（×400）。

## 【0036】

【図4】20デニールのポリウレタン弹性糸を3倍に伸張しつつ、三葉断面繊維を1重に巻き付けた被覆弹性糸（シングルカバリングヤーン）を用いたストッキングの着用時の編面状態を示す拡大模写図（×400）。

Example 9).

## [0030]

[Effects of the Invention] The polyamide modified cross-section fiber of the present invention, because it is a flat type cross section which possesses the center axis which the bending is done, the fine lusterous feel and soft texture, is something which shows the moderate chalis feel and the water absorbancy which is superior. The coated elastic yarn which uses the polyamide modified cross-section fiber of the present invention, the comparing to conventional ones, shows the satisfactory coating state.

[0031] The stocking which uses the coated elastic yarn of the present invention shows the clean flat surface state, gives the comfortable feel to the women which the wearing is done furthermore, in comparison with conventional ones, satisfaction the fashion sense it is possible.

## [0032]

## [0033]

[Figure 1] The explanatory diagram which shows the cross section shape of the polyamide modified cross-section fiber of the present invention typically.

## [0034]

[Figure 2] The copying figure which shows the cross section shape of the polyamide modified cross-section fiber of the present invention.

## [0035]

[Figure 3] While the drawing doing the polyurethane elastic yarn of the 20 denier in the 3 times, the expansion copying figure which shows the flat surface state at the time of the wearing of the stocking which uses the coated elastic yarn (single covering yarn) which winds the polyamide modified cross-section fiber of the present invention around 1 heavy (×400).

## [0036]

[Figure 4] While the drawing doing the polyurethane elastic yarn of the 20 denier in the 3 times, the expansion copying figure which shows the flat surface state at the time of the wearing of the stocking which uses the coated

【0037】

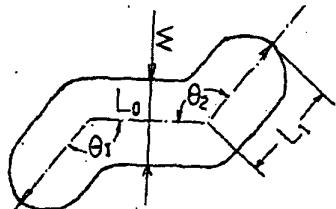
## 【符号の説明】

L0: ポリアミド異形断面繊維の偏平断面の屈曲した中心軸の長さ

L1: ポリアミド異形断面繊維の偏平断面の屈曲部の長さ

W: ポリアミド異形断面繊維の偏平断面の厚み

$\theta_1, \theta_2$ : ポリアミド異形断面繊維の偏平断面の屈曲角度



【図2】

elastic yarn (single covering yarn) which winds the trilobal cross section fiber around 1 heavy (x400).

[0037]

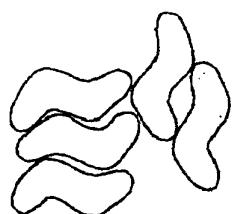
## [Explanation of Reference Signs in Drawings]

L0: The bending of the flat cross section of the polyamide modified cross-section fiber is done the length of the center axis which

L1: length of bending part of flat cross section of polyamide modified cross-section fiber

W: thickness of flat cross section of polyamide modified cross-section fiber

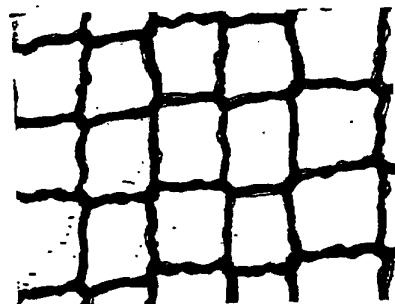
$\theta_1, \theta_2$ : bending angle of flat cross section of polyamide modified cross-section fiber



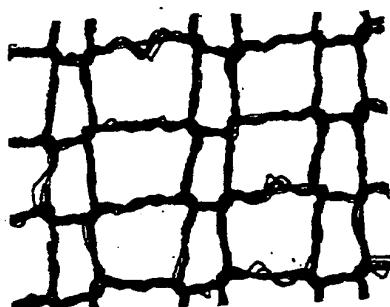
【図3】

[Figure 2]

[Figure 3]



【図4】



[Figure 4]

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